



UNIVERSITAS SEBELAS MARET
FACULTY OF TEACHER TRAINING AND EDUCATION
BACHELOR OF BIOLOGY EDUCATION STUDY PROGRAM

Building D 3rd Floor FTTE UNS Jl Ir. Sutami No. 36 A Ketingan Surakarta 57126 Indonesia

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Microbial Culture Technique

Undergraduate Programme in Biology Education

Module Handbook

Module Name	Microbial Culture Technique (Teknik Biakan Mikroba)																		
Module level	Undergraduate Programme																		
Course Code	02013152022																		
Sub-title, if applicable	-																		
Courses, if applicable	-																		
Semester/Term	4 th																		
Module coordinator (s)	Dr. Slamet Santosa M.Si																		
Lecturer (s)	Dr. Slamet Santosa, M.Si Dr. Umi Fatmawati, M.Si																		
Language	Bahasa Indonesia (Indonesian Language)																		
Classification within the curriculum	Elective																		
Teaching format/class hours per week during the semester	Direct instruction/face to face/blended learning: 26.7 hours / Week /semester: lecture, discussion, workshop, integrated laboratory work Structured Activity: 32 hours / Week / semester (Through the analysis of journal articles, students learn to analyze the abnormalities in metabolic diseases, cellular respiration pathways, and biomolecule metabolism and catabolism) Self-study Activity: 32 hours / Week / semester (Students learn morphological identification techniques and microbial activity from various sources)																		
Workload	<table><tr><th>Type</th><th>CSU</th><th>Face to Face</th><th>Structured Activities</th><th>Self-study</th></tr><tr><td>T/P</td><td>2</td><td>26.7h (0.88 ECTS)</td><td>32h (1.06 ECTS)</td><td>32h (1.06 ECTS)</td></tr><tr><td>Total</td><td>2</td><td colspan="3">90.7 h (3 ECTS)</td></tr></table>				Type	CSU	Face to Face	Structured Activities	Self-study	T/P	2	26.7h (0.88 ECTS)	32h (1.06 ECTS)	32h (1.06 ECTS)	Total	2	90.7 h (3 ECTS)		
Type	CSU	Face to Face	Structured Activities	Self-study															
T/P	2	26.7h (0.88 ECTS)	32h (1.06 ECTS)	32h (1.06 ECTS)															
Total	2	90.7 h (3 ECTS)																	
Requirements	Has taken courses in Microbiology																		
Credit Point	2 CSU (3 ECTS)																		



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Learning goals/competencies	PLO 2 They are able to apply the basic advance knowledge in biology to solve the problem in biology PLO 4 Have knowledge related to biological research methodologies and their learning, be able to apply and publish the results PLO 6 They are able to demonstrate laboratory works, design and implement the experiment based on laboratory knowledge, skills, safety, environmental issue, and social ethics problem CLO 1 Students can apply the principles of sterilization and produce microbial culture media in the form of solid or liquid (PLO 2, PLO 6) CLO 2 Students can applying the principle of microbial inoculation with various techniques such as streak agar, spread dish, pouring dish, stab agar. (PLO 2, PLO 6) CLO 3 Students can perform isolation and screening of potential microbes from various types of samples, such as soil, rhizosphere, and endophytes (PLO 2, PLO 4, PLO 6) CLO 4 Students can identify morphological and biochemical characteristics of potential microbial isolates (PLO 2, PLO 4, PLO 6) <table><tr><th>CLO/ PLO</th><th>P L O 1</th><th>P L O 2</th><th>P L O 3</th><th>P L O 4</th><th>P L O 5</th><th>P L O 6</th><th>P L O 7</th><th>P L O 8</th><th>P L O 9</th><th>P L O 10</th></tr><tr><td>CLO1</td><td></td><td>*</td><td></td><td></td><td></td><td>*</td><td></td><td></td><td></td><td></td></tr><tr><td>CLO2</td><td></td><td>*</td><td></td><td></td><td></td><td>*</td><td></td><td></td><td></td><td></td></tr><tr><td>CLO3</td><td></td><td>*</td><td></td><td>*</td><td></td><td>*</td><td></td><td></td><td></td><td></td></tr><tr><td>CLO4</td><td></td><td>*</td><td></td><td>*</td><td></td><td>*</td><td></td><td></td><td></td><td></td></tr></table>	CLO/ PLO	P L O 1	P L O 2	P L O 3	P L O 4	P L O 5	P L O 6	P L O 7	P L O 8	P L O 9	P L O 10	CLO1		*				*					CLO2		*				*					CLO3		*		*		*					CLO4		*		*		*				
CLO/ PLO	P L O 1	P L O 2	P L O 3	P L O 4	P L O 5	P L O 6	P L O 7	P L O 8	P L O 9	P L O 10																																														
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CLO2		*				*																																																		
CLO3		*		*		*																																																		
CLO4		*		*		*																																																		
Content	Microbial Culture Technology is an optional course for study programs that examines: manufacture of microbial culture media, sterilization, transfer of cultures, inoculation techniques, morphological identification techniques and microbial activity (enzymatic activity, antagonistic activity, indole production, phosphate dissolution and potassium dissolution from microbes).																																																							



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Attribute Soft skill	1. Adaptable to the problem, self motivated, collaborative work, responsible 2. Able to write the report and communicate scientifically												
Study/exam achievements	Students are considered to complete the course and pass if they obtain at least 60% of maximum final score. The final score (FS) is calculated based on the following ratio: <table><tr><th>Assessment</th><th>Proportion</th></tr><tr><td>laboratorium activity</td><td>30%</td></tr><tr><td>Participation</td><td>10%</td></tr><tr><td>Mid-Term Test</td><td>30%</td></tr><tr><td>Final Exam</td><td>30%</td></tr><tr><td>Final Score</td><td>100%</td></tr></table>	Assessment	Proportion	laboratorium activity	30%	Participation	10%	Mid-Term Test	30%	Final Exam	30%	Final Score	100%
Assessment	Proportion												
laboratorium activity	30%												
Participation	10%												
Mid-Term Test	30%												
Final Exam	30%												
Final Score	100%												
Form of Media	Power point slide, specimen												
Literature (primary references)	1. Madigan, Martinko, Stahl, Clark. 2012. Brock Biology of Microorganism. Benjamin Cummings, San Francisco USA 2. Moat AG, Foster JW, Spector MP. 2002. Microbial Physiology. John Willey. New York USA 3. Sunatmo TI. 2009. Mikrobiologi Esensial Jilid 1 dan 2. Ardy Agency. Jakarta 4. Sunatmo TI. 2009. Eksperimen Mikrobiologi dalam Laboratorium. Ardy Agency. Jakarta 5. Hazra F, Susanti WI. 2017. Buku Panduan Praktikum Bioteknologi Tanah. IPB Press. Bogor 6. Fatmawati et.al. 2019. Isolation of actinomycetes from maize rhizosphere from Kupang, East Nusa Tenggara Province, and evaluation of their antibacterial, antifungal, and extracellular enzyme activity. International Journal of Biotechnology. Vol 23(1), 2018, 40-47 7. Fatmawati et. al. 2019. Screening and characterization of actinomycetes isolated from soybean rhizosphere for promoting plant growth. Biodiversitas Vol 20, No 10: 11-21												



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ASSESSMENT

CPL 02/LO2 Mastering basic biology knowledge and branches of biology to solve biological problems

TEST indicator

Sub CLO	INDICATOR
CLO 1	1. Students can identify various types of bacterial and fungal culture media
	2. Students can correlate nutritional needs in supporting the growth of certain microbes
CLO 2	1. Students can evaluate the principle of microbial inoculation related to bacterial growth characteristics
CLO 3	1. Students can analyze microbial growth requirements of each sample
	2. Students can identify the potential characteristic in microbe and know how to screen it
CLO 4	1. identify morphological and biochemical characteristics of potential microbial isolates

CPL 04/LO4 Have knowledge related to biological research methodologies and their learning, be able to apply and publish the results

LABORATORY METHODOLOGY RUBRIC

ASPECT	INDICATOR	SCORE
Understanding the technique	No appreciation of the basis of techniques or methods.	1
	Little understanding of the theory behind techniques, methods or equipment; blindly follows instructions.	2
	Understands the major techniques/methods in outline.	3
	Understands the principles of most techniques/methods.	4
	Understands the detailed rationale of almost all	5



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	techniques/methods.	
	Exemplary understanding of all aspects of techniques/methods used. Can rationally adapt techniques.	6
Practical Ability	Failed to master even basic techniques/methods.	1
	Difficulty in following demonstrated techniques or methods; forgetful of details.	2
	Learned from mistakes in early attempts to master techniques/methods.	3
	Acquired and retained practical skills rapidly on demonstration.	4
	Able to reproduce methods even from published protocols.	5
	Developed own methods in furtherance of the aims of the project.	6
Reliability/Reproducibility of Data	Data irreproducible/unreliable and always untrustworthy.	1
	Little confidence in reliability/reproducibility of data.	2
	Trends in data or observation sometimes discernible.	3
	Normally reliable data. Only occasional lapses in reproducibility.	4
	Results highly reproducible; data can be relied on.	5
	Results currently being written up for publication.	6
Interpretation of Data	Unable to attempt any explanation for data/observations or to draw conclusions.	1
	Uses incorrect methods and/or logic in analysis of data/observations.	2
	Attempts analysis of data/observations, but unable to draw many valid conclusions.	3
	Often able to draw plausible conclusions; may require assistance in some cases.	4
	Shows good analytical skill and ability to draw valid/sensible conclusions from observations or data.	5
	Demonstrates novel insights or interpretations of experiments, suitable for publication.	6
Interaction	Inappropriate or inconsiderate attitude to other laboratory workers or support staff.	
	Little or no interaction with other workers.	
	Minimum interaction with others, without seeking advice.	
	Adequate interaction with other staff, without very productive result.	
	Interacts productively with other staff - a good lab member.	
	Productive interaction and discussion with other staff, enhancing progress of project.	



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Reliability and Commitment	Uncommitted and unreliable. Demonstrated no interest in or motivation for project work.	
	Little commitment. Less than adequate attendance.	
	Adequate, but not complete attendance. Low commitment.	
	Showed interest in project work with only occasional lapses. Available time adequately utilised.	
	Enthusiastic about project. Reliable, with full attendance.	
	Very highly committed and motivated. Made full and productive use of time.	

CPL Assessment Instrument 06/LO 06 Have knowledge related to biological research methodology and its learning, can apply and publish the results

PRACTICUM PERFORMANCE ASSESSMENT

Practicum Performance Observation Sheet

No	Name	Aspects of Performance Assessment										Total Score	Note
		1	2	3	4	5	6	7	8	9	10		
1													
2													
3													
4													
5													
Ds t													

Information:

- 1 = Practical equipment
- 2 = Physical appearance readiness
- 3 = Interpret
- 4 = Predict
- 5 = Applying the concept
- 6 = Planning an experiment
- 7 = Doing an experiment
- 8 = Communicate

Practicum Performance Assessment Rubric

No	Aspect	Criteria	Score
Preparation			
1	Practical equipment	Bring/prepare all (100%) tools and materials.	4



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		Not bringing 25% of the total tools/materials or 25% of the total tools/materials not in accordance with the provisions.	3
		Not bringing 50% of the total tools/materials or 50% of the total tools/materials not in accordance with the provisions	2
		Not bringing 75% of the total tools/materials or 75% of the total tools/materials not in accordance with the provisions	1
2	Physical appearance readiness	Lab coat worn and neat appearance.	4
		Wearing a lab coat and looking untidy (wearing t-shirts, shorts, or not wearing shoes)	3
		Do not wear a lab coat and look presentable.	2
		Not wearing a lab coat and looking untidy (wearing t-shirts, shorts, or not wearing shoes).	1
Using tools and materials			
3	Discipline of practical tools/materials	All tools/materials are taken neatly and not scattered.	4
		25% of the total tools/materials were taken untidy and scattered.	3
		50% of the total tools/materials were taken untidy and scattered.	2
		75% of the total tools/materials were taken untidy and scattered.	1
4	Appropriateness of practical tools/materials	All tools/materials are taken as needed.	4
		Take 25% of the total tools/materials that are not as needed.	3
		Take 50% of the total tools/materials that are not as needed.	2
		Taking 75% of the total tools/materials that are not as needed.	1
5	Correct operation of the tool	All tools are operated properly.	4
		25% of the total tools are operated incorrectly.	3
		50% of the total tools are operated incorrectly.	2
		75% of the total tools are operated incorrectly.	1
6	Practicum Procedure	melakukan 100% langkah praktikum dengan benar.	4
		melakukan 75% langkah praktikum dengan benar.	3
		melakukan 50% langkah praktikum dengan benar.	2
		melakukan 25% langkah praktikum dengan benar.	1
Result			
7	Practical result	Using as many senses as possible in making observations and doing it carefully according to procedures	4



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		Using few senses in making observations and doing it according to procedures	3
		Using as many senses as possible in making observations but not being thorough	2
		Observing the practical results at a glance	1
8	Practical data	Complete the table according to the results of observations, accompanied by pictures, and accompanied by additional data (information) on the results of the practicum (3 aspects are all fulfilled)	4
		Complete the table according to the results of observations, accompanied by pictures, or accompanied by additional data (information) on the results of the practicum (2 aspects are well fulfilled)	3
		Complete the table according to the results of observations, accompanied by pictures, and accompanied by additional data (information) on the results of the practicum (1 aspect is well fulfilled)	2
		Complete the table according to the results of observations, accompanied by pictures, and accompanied by additional data (information) on the results of the practicum (no aspect is fulfilled properly)	1
Closing			
9	Cleanliness of tools that have been used	All tools that have been used are cleaned properly and returned	4
		Clean all tools that have been used but are not completely clean and return them	3
		Only clean half of used tools and return them	2
		Only clean one or two tools and don't restore all tools	1
10	Practice table cleaning	Clean the table until it's really clean	4
		Cleaning the table but still leaving dirt or trash	3
		Only clean part of the side of the table	2
		The table is still dirty, but throw away the dirt or trash	1

PRACTICUM REPORT RUBRIC ASSESSMENT

No	Aspek	Score			
		1	2	3	4
1	Write the title and purpose of the practicum correctly				



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2	Formulate the problem				
3	Write the theoretical basis clearly and concisely				
4	Arrange tools, materials and work steps appropriately				
5	Presenting data systematically and communicatively				
6	Analyze data and discussion comprehensively				
7	Drawing conclusions				
8	Writing bibliography				
9	Attachments (evidence of activities, documentation, interim reports)				
10	Timely collection				

CPL Assessment Instrument 07/ LO 7 Have the ability to solve problems within the scope of work and present the results in an argumentative manner

GROUP PRESENTATION ASSESSMENT RUBRIC

Group : _____

Date : _____

A. Presentation

No	Aspect	4 Very Good	3 Good	2 Sufficient	1 less
Kelompok					
1	Presentation Manajemen	The presentation is very systematic and very easy to follow. Transfers between group members are well organized and neatly executed.	The presentation is quite organized and quite easy to follow. Transitions may be a bit cut off but don't take up much time from the whole presentation.	Presentation is not well managed. The transfer of presentations between members looks not smooth.	Presentation is not managed. The transitions between group members in the presentation looked poor. Presentations are less organized and very difficult to follow.
2	Student Colaborative	Very good group cooperation with each other can be seen in the distribution of presentations, work, and	The group worked well with each other and communicated well. Some members	Group communication is relatively poor; some members dominate the presentation and	No teamwork seen. Each member is indifferent and does not help each other.



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		answering questions evenly to all group members.	participate a little more than others.	others do not participate much.	
3	Quality of the media used for presentation	The media/PPT used is effective during the presentation. Group members use the media as a supplement, not as a crutch.	The media/PPT used was somewhat effective but not consistently used during the presentation.	The media/PPT used was somewhat effective but not consistently used during the presentation.	Do not use Media/PPT at all.
4	Performance when delivering material	Group members have very strong material knowledge and the material is delivered thoroughly. No mistakes were made with respect to material knowledge.	Most group members have a solid understanding of the material. Few material elements are missing or contain minor errors.	Group members have little understanding of the material. Several mistakes were made during the presentation.	Group members have little or no understanding of the material covered in the presentation.

Final Score : $\frac{\text{Gained Score}}{16} \times 100$

B. Catatan partisipasi peserta:

Name: _____ Question: _____

Name: _____ Question: _____

Name: _____ Question: _____

Moderator: _____

DISCUSSION ASSESSMENT RUBRIC

Class/Group : _____

Date : _____

A. Idea/opinion

No	Aspect	4	3	2	1
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		Very good	Good	Sufficient	Less
1	Skills in conveying ideas/answers/questions attract attention, motivate, articulation, gesture)	Students can make the audience focus on listening to ideas or answers by showing 4 things, namely being able to attract attention, giving motivation, clear articulation and appropriate gestures.	Shows 3 things from being able to attract attention, giving motivation, clear articulation and appropriate gestures.	Shows 2 things from being able to attract attention, giving motivation, clear articulation and appropriate gestures.	Shows 1 thing from being able to attract attention, giving motivation, clear articulation and appropriate gestures.
2	Attitude to the question asked	Received questions very well and tried to answer	Receive questions and throw them to other members/friends to answer	Shows an attitude of disliking questions	Showing disdain for the question
3	Ability to answer questions	Provide answers according to the questions and in accordance with the material explained during the presentation and the questioner is satisfied with the answer	Gives correct answers but in circles that require repeated explanations	Gives an answer but the questioner is not satisfied/understood	Looks less serious by giving the original answer that is important to answer and not appropriate

Final Score : $\frac{\text{Gained score}}{12} \times 100$

B. Participant notes:

Name: _____ Question: _____

Name: _____ Question: _____

Moderator: _____



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